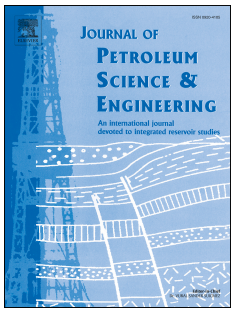
Accepted Manuscript



Estimating source rock parameters using wireline data: An example from Dezful Embayment, South West of Iran

Bahram Alizadeh, Khaled Maroufi, Mohamad Hossein Heidarifard

PII: S0920-4105(17)30977-4

DOI: 10.1016/j.petrol.2017.12.021

Reference: PETROL 4511

To appear in: *Journal of Petroleum Science and Engineering*

Received Date: 1 May 2016

Revised Date: 4 November 2017

Accepted Date: 7 December 2017

Please cite this article as: Alizadeh, B., Maroufi, K., Heidarifard, M.H., Estimating source rock parameters using wireline data: An example from Dezful Embayment, South West of Iran, *Journal of Petroleum Science and Engineering* (2018), doi: 10.1016/j.petrol.2017.12.021.

Estimating Source Rock Parameters Using Wireline Data: An Example from Dezful Embayment, South West of Iran

Bahram Alizadeh *[a,b], Khaled Maroufi [a], Mohamad Hossein Heidarifard [c]

[a] Department of Geology, Faculty of Earth Sciences, Shahid Chamran University, Ahvaz, Iran

[b] Petroleum Geology and Geochemistry Research Centre (PGGRC), Shahid Chamran University, Ahvaz, Iran

[c] Department of Geology, National Iranian South Oil Company (NISOC), Iran

* Corresponding author: Tel.: +98 61 33330136; Fax: +98 61 33331059; E-mail: alizadeh@scu.ac.ir

Abstract

Availability and high potential of wireline data to correlate with geochemical properties convinced petroleum geologists to use them for source rock detection and calculating their richness. In this research, intelligent techniques and mathematical relationships were used to evaluate source rock potential and organic matter type indirectly. Artificial neural networks (ANN) and ΔLogR techniques were successfully used to model the relation between wireline logs and Total Organic Carbon (TOC) content. Furthermore, wireline data and TOC values were used as input data to model a second ANN for S_2 parameter (present hydrocarbon potential) calculation. Owing to its great ability in the course of solving non-linear problems with overwhelming complexity, the back propagation method was used to train the networks using 70 points datasets. Predicted TOC contents were validated by Rock-Eval pyrolysis results of which revealed dependency of the ΔLogR accuracy to the organic richness and lithology, and therefore higher precision of the ANN outputs in compare to the ΔLogR results. Hydrogen Index (HI) and kerogen type were also effectively predicted using mathematical relationship between TOC and S_2 factors. Reliability of all steps of the methodology was approved using a 16 members retest dataset for which testing predicted parameters against measured data demonstrated good correlation coefficients combined with negligible errors. Finally, applicability of the methodology was checked by applying it on two wells in the Dezful Embayment to evaluate geochemical and depositional properties of the Paleocene-Early Oligocene Pabdeh Formation.

Keywords

Artificial neural network; wireline data; Source rock; Dezful Embayment; Rock-Eval pyrolysis.